HONEY-BEE PREDATORS

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It has always been a source of wonder that certain insects are able to overcome so powerfully defended an animal as the domestic bee equipped as she is with a venomous sting which would soon kill any other insect if it could be successfully brought to bear. The writer has always been interested in apiculture but has never been able to work around bees because of the violent effects of their stings. Of the common insects able to sting, the ordinary honey-bee is by far the worst in my personal experience. This is probably due in part to their habit of stinging without provocation and also to the fact that the poison sac is left, with the sting, in the wound thus enabling a greater amount of toxin to enter the system than with wasps which withdraw the sting after each stab. Just one sting is likely to have a serious systemic effect and my only recourse has been to keep off my feet several hours after being stung and to apply cold compresses to the injury. For many years I have made observations at Stamford, Connecticut, on the Arthropods which kill bees and these are herewith presented. These prey records cover the years 1929 to 1947. In no case was the bee predation sufficient to cause economic losses to bee-keepers. The role of predators in bee-killing is a very minor one these days compared with the losses of bees poisoned by arsenicals, DDT and other insecticidal sprays and dusts, or dying from such diseases as American foul brood. It seems quite probable, moreover, that in New England at least, bee-predators never did cause economic losses to apiarists.

Of the records here submitted; 260 pertain to insect predators, 243 to spiders. Honey-bee predators in the Stamford area are (1) ambush bugs, (2) robber flies, (3) mantids, (4) dragon flies, (5) hornets or wasps, and (6) soldier bugs among the insects; and certain flower spiders, orbweavers, grass spiders and house spiders among the Arachnida.

I. INSECTS

1. AMBUSH BUGS. Certain years the common ambush bug, *Phymata pennsylvanica* Handl., may be very abundant on certain flowers during mid and late summer feeding on flower-frequenting insects. They are especially fond of the honey-bee which they are able to overcome after a struggle. Sometimes 2 or 3 other ambush bugs will feed on a kill, often simultaneously. I have 147 Stamford records of their preying on honey-bees. Most of these were on hydrangea, spirea, helenium and asters in flower gardens or on goldenrod or sumac blossoms in the wild.

2. ROBBER FLIES. Certain robber flies have long been known as enemies of the honey-bee. I have the following Stamford records.

Nebraska bee-killer, *Promachus fitchii* O. S. 22
Bumblebee robber fly, *Bombomima thoracica* Fabr. 18
Brown robber fly, *Proctacanthus philadelphicus* Macq. 10
Discolored robber fly, *Diogmites discolor* Loew 10
False Nebraska bee-killer, *Promachus bastardii* Macq. 3
Japanese beetle-killer, *Bombomima grossa* Fabr. 2
Small bumblebee robber fly, *Bombomima flavicollis* Say 1
Fly-hawk, *Erax aestuans* L. 1

Of these 8 species, the bumble bee mimic, *B. thoracica* (*alias Dasyllis* or *Laphria thoracica!*) is the only one I have seen killing bees close to the hives; most of the others take bees around flowers. During the past 12 years, *Proctacanthus philadelphicus, Promachus fitchii, P. bastardii* and *Diogmites* (formerly *Deromyia*) *discolor,* all once common, have become increasingly rare in this area, due no doubt to the growing scarcity of the white grub, *Phyllophaga fusca,* which was apparently the principal food of the larvæ of these flies. This decrease of the native white grub seems to have coincided with the advent of the Japanese beetle, *Popillia japonica,* which has successfully invaded New England from the adjacent areas to the southwest.

Of the above records; *P. fitchii* captured honey-bees in hay fields and lawns near white clover blossoms; *B. thoracica* in apiaries, or among *Deutzia* or white clover blossoms; *P. philadelphicus* in old fields or pastures near goldenrod or buckwheat blossoms; *D. discolor* around goldenrod, asters, flower gardens

and buckwheat fields; *P. bastardii* at sumac blossoms in what had been an open oak grove, clean cut and lumbered out a year or two before; *B. grossa* in a tasseling corn field and at edge of a sumac clump; *B. flavicollis* on a log in the sunlight in a cut-over woodlot; and *E. æstuans* (a large female) on a plantain blossom within 100 yards of an apiary.

3. MANTIDS. Twenty-eight honey-bee prey records were taken from the Chinese mantis, *Tenodera sinensis* Sauss. These were obtained either on goldenrod blossoms or in flower gardens.

4. DRAGON FLIES. Many dragon flies have been seen to dart at honey-bees in flight, but only 5 actual captures where feeding took place have been noted. Three records of the green darning-needle fly, *Anax junius* Drury, have been taken: one near a bee-hive, two others over goldenrod. The giant dragon fly *Epi-aeschna heros* Fabr., was in one instance seen to seize a honey-bee around Chinese beauty-bush (*Kolkowitzia*) blossoms. Amid a profusion of meadow spirea and early sumac at the edge of a woods, a wood flying-adder, *Cordulegaster diastatops* Selys., was taken feeding on a honey-bee worker.

5. HORNETS OR WASPS. Worker European hornets, *Vespa crabro* L., were seen on 5 different occasions killing honey-bees in goldenrod fields. One instance each of the English wasp, *Vespa vulgaris* L., and of the native ground nesting yellow-jacket, *Vespa maculifrons* Buy., were noted by Stamford bee-keepers. The last 2 vespids belong to the subgenus *Vespula.* While hornets are of little importance as bee-predators in New England, they are dangerous enemies of bees in certain parts of the World. In China, the great *Vespa mandarina* is one of the most serious of bee-predators, as the following extract from a letter written by Dr. E. R. Tinkham dated October 13, 1947 testifies.

"You may be interested to know that I was on the Lingnan University staff from 1933–1936 and full time Ass't Curator of the Lingnan Natural History Survey and Museum from 1934–1936. A great number of my 38 publications are on the Orthoptera of China and a few on Lepidoptera and Odonata. Perhaps you would be interested in some remarks on 'bee-killers.' In 1933–34 at Lingnan there was an American operat-

ing an apiary and he and I used to have many dinner table chats on his problems. The two biggest seemed to be the giant wasps and the Deaths-head Hawk Moths. The latter stole much honey during the night and apparently intimidated the bees by their squeak. Their depredations, however, were controlled by placing coarse wire screen over the entrance to the hives. A much more troublesome and unsolved problem was the control of the huge wasps *Vespa mandarina* that perched on the supers and slaughtered great numbers of bees daily. The numbers seem to stick in my mind—30–40 bees daily for each wasp. As far as I can recall I do not think Asilids entered into the situation for on the whole they are rare. I have collected rather extensively in south China, west to Yunnan and in Formosa but the Asilids collected were very few and probably all deposited in the Lingnan Museum."

6. SOLDIER BUGS. Four instances of the pale soldierbug, *Podisus placidus* Uhl., feeding on honey-bees after impaling them on sumac blossoms have been obtained. Two records of nymphs of the spined soldier bug, *Podisus maculiventris* Say, were also secured.

II. SPIDERS

Spiders catch many honey-bees either in their webs or on flowers.

1. FLOWER SPIDERS. Forty-eight records of the yellow crab spider, *Misumena aleatoria* Hentz,[1] have been obtained, mostly on goldenrod blossoms, among which the spiders nestle and, secure in their protective coloration, seize the unwary bee before she is cognizant of danger. One is reminded of the old proverb by Ben Johnson:

"The bee and the spider
By some diverse power
Suck honey and poison
From the self-same flower"

except that in this case the bee gets the poison and the spider the honey, second hand!

2. ORBWEAVERS. Certain orbweaving spiders become abundant in late summer. Their wheel-like webs occur in goldenrod, aster, hydrangeas and the blossoms of many garden flowers. The

largest and most striking spider of this group is the black and yellow garden or blackberry spider, *Argiope aurantia* Lucas. Seventy-nine records of honey-bees captured in the webs of this spider, mostly in goldenrod have been secured. Twenty-two honey-bees have been noted in the webs of the smaller Silvery garden spider, *Argiope trifasciata* Forskal. In among hydrangea, goldenrod and asters, the webs of the large white orb-weaver, *Epeira obesa* Hentz, have claimed 46 honey-bee victims, while 38 have been noted in the webs of the red and yellow orb-weaver, *Epeira raji* Scopoli.[2] One was noted in a web of the dusky orbweaver, *Epeira domiciliorum* Hentz.

3. GRASS SPIDERS. In the webs of the grass funnel spider, *Agelena nævia* Walck., 4 honey-bees have been seen near a shed adjacent to an apiary.

4. HOUSE SPIDERS. Five honey-bees have been noted trapped in the webs of the common house spider, *Theridion tepidariorum* C. Koch., located outside a shed near the bee hives.

[1,2] Specifically identified through the kindness of Dr. W. J. Gertsch of the American Museum of Natural History, New York City.